Po-Chih Chen

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Education

National Taiwan University (NTU) *Taipei, Taiwan*

M.S. in Electrical Engineering (GPA: 4.04/4.3) *2020 - 2022*

B.S. in Electrical Engineering (GPA: 3.69/4.3) *2016 - 2020*

- Courses: Robotics, Computer-aided Engineering Drawing, Optimization in Engineering, Linear System, Neuro-control Systems, Precision Motion Control, Machine Learning

Research Experience

Next-generation Automated Surgical Apparatus Lab, NTU, Prof. Cheng-Wei Chen *Taipei, Taiwan*

Graduate / Undergraduate Researcher *2020 - 2022*

- **The infant Cardiac Robotic System (iCROSS)** [1]
  1. Defined the clinical specifications for the proposed robot-assisted pediatric cardiac surgery
  2. Designed and built the system, which can adapt general instruments and collaborate within one single small incision
  3. Evaluate the performance of the system in terms of workspace, accuracy, precision, and latency in teleoperation; perform dry-lab experiments on an infant model generated from CT scans
- **The intraOcular RoBotic Interventional System (iORBIS)** [2]
  1. Solved the existing backlash issue by using a tension spring mechanism
  2. Solved the unstable joint issue by designing a new adapter for one of the actuators

International Center of Excellence in Intelligent Robotics and Automation Research (iCeiRA), NTU, Prof. Ren C. Luo *Taipei, Taiwan*

Undergraduate Researcher *2018 - 2019*

- **The UarmBot**
  1. Designed and built an 8-axis quadruped robot integrated with a 5-axis robotic arm, aiming at performing general tasks
  2. Integrated the system with 3D vision system and implemented SLAM function using ROS
- **The BoxSpider**
  1. Designed and built a 12-axis quadruped robot that can fold itself into a small box; the robot is designed for field missions
  2. Integrated the system with 3D vision system and lidar for navigation

Publications

[1] **P.-C. Chen**, P.-A. Hsieh, J.-Y. Huang, S.-C. Huang, and C.-W. Chen, "Design and Evaluation of the infant Cardiac Robotic Surgical System (iCROSS)," 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), October 23-27, 2022, Kyoto, Japan

[2] C.-W. Chen, H.-C. Chen, H.-Y. Yang, X.-Y. Zeng, X.-H. Wu, and **P.-C. Chen**, "intraOcular Robotic Interventional System (iORBIS): Mechanical Design for Distally-Actuated Instrument Insertion and Automatic Tool Change," Mechanism and Machine Theory, vol.167, p. 104568, 2022. **[sciencedirect]**

Honors & Awards

2022 **1st Place in CIEE Youth Thesis Award**, one of the most prestigious thesis awards for EE graduate students in Taiwan

2020 **Social Devotion Special Award**, NTU, for developing automatic access systems during the **COVID-19 Pandemic**

2020 **1st Place in STMicroelectronics Enterprise Award, 2nd Place in MediaTek Enterprise Award & Best Maker Award**, MakeNTU, the largest nationwide hardware hackathon in Taiwan (out of 40 teams)

2020 **Altruistic Award**, College of EECS, NTU, for devotion to public services and rendering help to others

2019 **2nd Place**, HTC AI Contest, with the topic "Chest X-Ray Pneumonia Detection"

2019 **1st Place**, Robotics Course Competition

2018 **Top 8 finalist**, Microsoft Imagine Cup Taiwan Final

2018 **1st Place in Microsoft Enterprise Award & Best Technology Award**, MakeNTU (out of 50 teams)

Skills

Programming Languages Python, C/C++, MATLAB/Simulink, LabVIEW, Verilog, Javascript (React)

Engineering Softwares 2D CAD (AutoCAD), 3D CAD (Fusion360, Inventor), PCB Layout (Altium Designer, Eagle)

Other Embedded Systems (Keil/CubeIDE), ROS, PyTorch, OpenCV, Git, LaTeX

Academic Projects

Air Hockey Robot
Taipei, Taiwan

Course term project of **Robotics** *Jan. 2019*

- Built an intelligent robotic arm system to play air hockey games with humans
- Sketched an air hockey table using **AutoCAD**, and built with woodworking and laser cutting
- Designed an **rule-based AI** and a trajectory planning algorithm with Matlab and implemented in C

Propeller-Powered Automatic Guided Vehicle
Taipei, Taiwan

Course term project of **Mechanical Engineering Practice** *June 2018*

- Built a pure, propeller-powered vehicle for trajectory tracking and obstacle avoiding
- Integrated vision, power, and propeller system with a Raspberry Pi
- Improved the performance of trajectory tracking using **real-time image processing** and **PID control**

Side Projects

Automatic Thermometer System with Smart Access Control
Taipei, Taiwan

Student Volunteer Team *June 2020*

- Motivated by the risk of staff being infected when measuring body temperature by hand during the **COVID-19 pandemic**
- Cooperated with NTU Computer Center, collecting students' body temperature and access information
- Designed electronic system and PCB layout, and wrote firmware on ESP-32 microcontroller in C
- **Entrusted by NTU**, manufacturing 80 devices and offering service to **protect 34,000 faculties and students** on campus
- Nominated as Altruistic Award and Social Devotion Special Award

Smart Coffee Bean Selecting Machine
Taipei, Taiwan

MakeNTU 2018 *Apr. 2018*

- Motivated by the time-consuming and tedious work for baristas to pick defective beans by hand before roasting
- Built a device automatically sifting low-quality coffee beans from green coffee beans
- **Impoved the accuracy by 2 times** - by designing a transparent conveyance system and installing cameras on both sides to detect defects
- Achieved 90% AUC in defects detection - by training a **deep learning model** with 1000+ labeled coffee bean pictures

Work Experience

Mantis Robotics Inc.
Taipei, Taiwan

Robotic Systems Engineer *Oct. 2022 – present*

- Developed and maintained the core system for a next-generation industrial robotic arm (C/C++)
- Developed and integrated a PIR-based sensor for safe human-robot interaction

Cardbo
Taipei, Taiwan

Co-founder & CTO *2019 - 2020*

- Created a credit card recommendation chatbot with more than 100k users
- Collaborated with 4 team members to develop the frontend and backend of the system

Extracurricular

IEEE NTU Studnet Branch
Taipei, Taiwan

Membership Officer *2020 - 2021*

- Organized and managed membership in the IEEE NTU Studnet Branch, providing assistance with
- Held study abroad seminars, with 100+ participants

HiddenNTU Club
Taipei, Taiwan

Vice President *2019 - 2020*

- Designed and hosted 2 real escape games on the campus, with 150+ participants
- Developed an IoT device that interacts with the plays with an RFID sensor, a speaker, and an LCD screen; on-campus Wi-Fi was utilized to synchronize the information with our server
- Developed a web-based App that delivered the contents and kept track of the games for the players

NTUMaker Club
Taipei, Taiwan

Director of Teaching *2017 – 2018*

- Promoted maker culture in NTU – by organizing and directing weekly courses, including woodworking, 2D/3D CAD, laser cutting, and Arduino
- Mentored 20+ group projects in 2 semesters and held 2 presentation events that attracted 100+ makers to join
- Exhibited the club's projects in Maker Faire Taipei 2017, the largest maker event in Taiwan